National Transportation Safety Board

Washington, D.C. 20594

June 20, 2006

Mike Linsdau
Director of Sales and Marketing
Hypro, Inc
2189 Seaver Lane,
Hoffman Estates, Illinois 60194

Ref: The capsizing of the small passenger vessel "Ethan Allen".
NTSB accident number DCA06MM001.

Dear Mike:

The investigative process dealing with the accident referenced above revealed an item of concern on the engine's raw water pump. An identification tag identified it as a Sherwood pump, part number M71-01-90, and that Sherwood was a division of Hypro Corporation. The three bolts intended to retain and seal the pumping section to the shaft section were found loose. The effect of the looseness was demonstrated to Hypro representatives, and other investigative party members, in the engine test cell at Cummins MerCruiser diesel will be dealt with in the factual report.

The Safety Board's Office of Marine Safety requests that Hypro conduct a review of the pump assembly and quality control processes and make changes, or add warnings, to ensure that pumps do not leave your facility with any loose hardware. The Office of Marine Safety would appreciate being informed of any changes enacted.

Thank you for Hypro's assistance in the referenced accident investigation.

Sincerely,

[redacted]

Morgan Turrell
Office of Marine Safety

[redacted]

HYPRO®

June 29, 2006

Office of Marine Safety NTSB Headquarters
490 L'Enfant Plaza, SW
Washington, DC 20594
Captain Morgan Turrell

Subject: Review of the pump assembly and quality control processes

Ref: The capsizing of the small passenger vessel "Ethan Allen".
NTSB accident number DCA06MM001.

Dear Morgan:

Attached is a response from our Quality Director Jim Walish. Hypro believes strongly in the highest levels of product quality, but we also wish to reiterate findings from the NTSB Lab Report and statements made in our Party Submission:

- The consistent and complete impression of the gasket, which was located between the pump base and the wear plate, was visible both on the metal pump base and the metal wear plate. In addition, the aluminum identification tag, which is located between a lockwasher and the pump housing, was crushed from the bolt being properly tightened upon pump assembly. Another bolt location showed a lockwasher imprint on the housing. These facts demonstrate that all of the pump's bolts had been properly tightened at some time before the accident. Further, the pump passed Hypro's in house quality control inspection before it left the control of Hypro. Therefore, sometime after leaving Hypro, the referenced pump housing bolts were manually backed out from the original manufactured position.

- Potential reasons for the loosening of the bolts and/or removal of the pump housing bolts during boat maintenance prior to accident include, but are not limited to: rubber impeller replacement or an impeller evaluation due to concerns of dry running as a result of temporary material blockage (plastic bag, etc.) to the suction line, rubber impeller replacement or impeller check due to the boat's sea cock not being reopened after repairs, and rubber impeller replacement or check as part of a commercial boat operations periodic maintenance.

- The main engine raw water pump was replaced approximately two months before the accident. There were no reported operational problems or leaking involving this pump during the hundreds of cruises of the Ethan Allen during that time period.

Morgan, early in the investigation the facts demonstrated the engine cooling pump did not play any causal role in the capsizing. We did not believe information about standard boat maintenance for engine rubber impeller pumps warranted NTSB attention until we received word of your request to have Hypro review our pump assembly and quality control process. As mentioned above, sometime after leaving Hypro, the referenced pump housing bolts were manually backed out from the original manufactured position.

cont.

cont.

Attached you will find the review of our pump assembly and quality control process. Hypro's position is that our processes and checks were effective in delivering a high quality pump. We appreciated the opportunity to participate in NTSB efforts to prevent future accidents and please contact if you have any questions or further comments.

Respectfully,

[redacted]

Mike Linsdau

HYPRO®

June 29, 2006

Office of Marine Safety NTSB Headquarters
490 L'Enfant Plaza, SW
Washington, DC 20594
Captain Morgan J. Turrell

Subject: Review of the pump assembly and quality control processes

Ref: The capsizing of the small passenger vessel "Ethan Allen".
NTSB accident number DCA06MM001.

Dear Captain Turrell:

Per the Office of Marine Safety's request, Hypro has reviewed the work instructions and quality control systems for the M71-01-90 raw sea water pump referenced in the above accident number. The manufacturing and quality control processes were found to comply with good manufacturing practice to meet design requirements and prevent shipment of defective product.

The bolts that assemble the impeller body to the engine flange are installed using a torque controlled air impact wrench set to 100 in-#.

All M71-01-90 pumps are subjected to a pressurized water leak test. The test pressure is between 25 & 30 PSIG. This test is performed after assembly and validates the pump to be leak tight. On May 12, 2005, the pump in question successfully passed through Hypro's manufacturing process which included controlled torque of the bolts and hydrostatic leak testing. The signed log indicating the pump had been tested is being provided. The test pressure was between 25 and 30 PSIG.

An investigation of our records revealed no previous history of customer complaints for loose bolts on M71-01-90 pumps. Our processes and checks were effective and remain effective in delivering a high quality, defect free, safe product. If you have further questions, please feel free to direct them to me through our Product Manager for the Marine Product Group, Mike Linsdau.

Sincerely,

[redacted]

Jim Walish
Director - Quality
Hypro
([redacted]7

PROCESS AND CONTROL DETAILS

M71 Check Sheet

Revision : D

Originator : Jason Churness

Date : 06/16/00

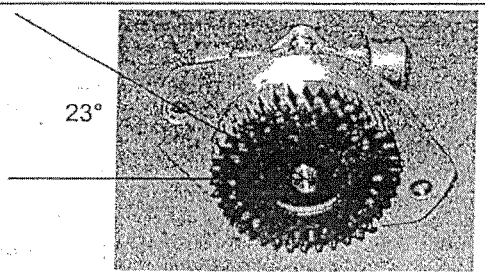
Cummins #:3912019
Sherwood #: M71
[redacted]

PART NUMBER: Rubber Impeller Pump
PART NUMBER: 3912019/M71
LOCATION: Hypro/Sherwood

Work Order: 48677
Quantity: 33
Date: 5·12·05

OPER NO	OPERATION	EQUIPMENT	CONTROL CHARACTERISTIC	SPECIFICATION	DEPARTMENT RESPONSIBLE	FREQ. OF INSPECTION	METHOD OF INSPECTION	DATA RECORDING METHOD	DEPT.	INITIAL
1	Proper identification	Visual	Cummins #:3912019 Sherwood #: M71 Date Code	Visual	Assembly	100%	Visual	Check Sheet	Assembly	[redacted]
2	Flange bolts torqued correctly	Air Wrenches	18 ft-lbs	+/- 5 ft-lbs	Assembly	100%	Torque Wrench	Check Sheet	Assembly	[redacted]
2.5	Adaptor positioned correctly	Visual	See picture below	Left side hole up 23°	Assembly	100%	Visual	Check Sheet	Assembly	[redacted]
3	Gear Height	Go/NoGo Gage	.501/.540	.501/.540	Assembly	100%	Go/NoGo Gage	Check Sheet	Assembly	[redacted]
4	Gear does not spin on shaft	Hand	Hand	Does not spin	Assembly	100%	Hand	Check Sheet	Assembly	[redacted]
5	Hydrostatic Test	Test stand and Fixture	Test at 55 - 60 psi	Pump is leak free	Assembly	100%	Visual / Hand	Check Sheet	Assembly	[redacted]

REV LEVEL	REVISION DISCRIPTION	REVISION DATE
D	Added picture	6/16/00
C	Increased test requirement to 55 - 60 psi	5/16/00
B	Added operation 2.5	6/1/99
A	Added operations 5.	10/8/98



National Transportation Safety Board

Washington, D.C. 20594

June 20, 2006

Derek Walden
Director of Customer Support
Cummins MerCruiser Diesel, LLC
4500 Leeds Avenue, Suite 301
Charleston, SC 29405

Ref: The capsizing of the small passenger vessel "Ethan Allen".
NTSB accident number DCA06MM001.

Dear Derek:

The investigative process dealing with the accident referenced above revealed an item of concern on the raw water pump attached to the Cummins engine installed in the vessel. An identification tag identified it as a Sherwood pump, part number M71-01-90, and that Sherwood was a division of Hypro Corporation. Hypro supply the pumps to Cummins for installation and parts distribution. The three bolts intended to retain and seal the pumping section to the shaft section and the lower of the two bolts that attached the pump to the engine were found loose. The effect of the looseness was demonstrated to Hypro representatives, and other investigative party members, in the engine test cell at your facility and will be dealt with in the factual report.

The Safety Board's Office of Marine Safety requests that Cummins review any installation instructions supplied with the pump and add a warning to highlight the importance of correct installation and possible consequences of incorrect installation. If no installation instructions are presently supplied in the package containing the pump then the warning could be inserted. It would be prudent to also include a check of the hardware involved in the assembly of the pump. The Office of Marine Safety would appreciate being informed of any action taken.

Thank you for Cummins' assistance in the referenced accident investigation.

Sincerely,

[redacted]

Morgan Turrell
Office of Marine Safety

[redacted]

Cummins MerCruiser Diesel
4500 Leeds Avenue #301
Charleston, SC 29405
Phone: 843 740 2700 Fax: 843 745 1616

July 11, 2006

Mr. Morgan Turrell
National Transportation Safety Board
Office of Marine Safety
490 L'Enfant Plaza, SW
Washington, D.C. 20594

Re: Accident No.: DCA06MM001 - Passenger Vessel Ethan Allen Capsizing in Lake George, New York

Dear Mr. Turrell:

The NTSB's investigation of this unfortunate and tragic accident has shown that the engine and water pump did not cause or contribute to the capsizing of the *Ethan Allen*. More specifically, the investigation has shown that: the water pump mounting bolts were not likely to have been in the condition in which they were observed after the incident before the craft capsized; the engine would have over-heated had it been operated in that condition for a brief period of time; and the leakage that might occur if the bolts were in that condition was insufficient to have caused or contributed to the capsizing of the *Ethan Allen*. These matters are addressed in greater detail in the working group report and the comments received from Cummins, Hypro and others.

As requested in your letter of June 20, 2006, we reviewed the instructions for removal and replacement of the Sherwood raw water pump, manufactured by HyPro Corp., for the B Series Marine Unit and considered the NTSB's suggestions. Those instructions are contained in the Operation and Maintenance Manual for the B and C Series Propulsion Units (the "Manual"). For the reasons that follow, we disagree that changes in the Manual are necessary or desirable from a safety standpoint. (A copy of the instructions corresponding to the water pump for the *Ethan Allen* is enclosed for your reference).

The Manual is provided to all first owners of the B and C Series Marine Propulsion Units at the time of purchase and is also available from the local Cummins authorized distributor as well as the Cummins Customer Assistance Center (1-800-Diesels). Step-by-step instructions and helpful illustrations are included for use in removing and replacing the water pump. The instructions contain a specific reference to removing and replacing the bolts referenced in your letter and information is provided about the tools and torque values to use when performing that task.

We believe that the instructions for removing and replacing the water pump were and are comprehensible and appropriate for the task, and that persons performing that work should be

able to understand and safely follow those instructions. Indeed, most persons performing such work should be well versed in maintaining equipment of this nature. We also believe that those persons are already well aware of the potential consequences, including leakage, of failing to properly remove and replace the water pump or failing to tighten the water pump's bolts. Moreover, as the NTSB testing demonstrated, the consequences of failing to tighten the water pump bolts would be immediately evident in the performance of the engine and readily visible to the person making the repair, and the operator and crew.

We also believe that the addition of statements such as that suggested in your letter may be counter-productive and tend to dilute the effectiveness of the information contained in the Manual as a whole, particularly when carried to their logical extreme. There are many screws, bolts and fasteners on a watercraft such as this and it is not practically possible or reasonably necessary from a safety standpoint to inform persons performing maintenance and repairs on such craft that the failure to tighten a screw, bolt or other fastener may result in leakage of water or other fluid. While we respect and value the NTSB's input, we do not agree that additional instructions are necessary in this instance.

We appreciate the opportunity to comment on your letter and are available to discuss our position on this issue should you or the Agency feel that further dialogue or discussion is necessary or appropriate in the interests of safety.

Sincerely,

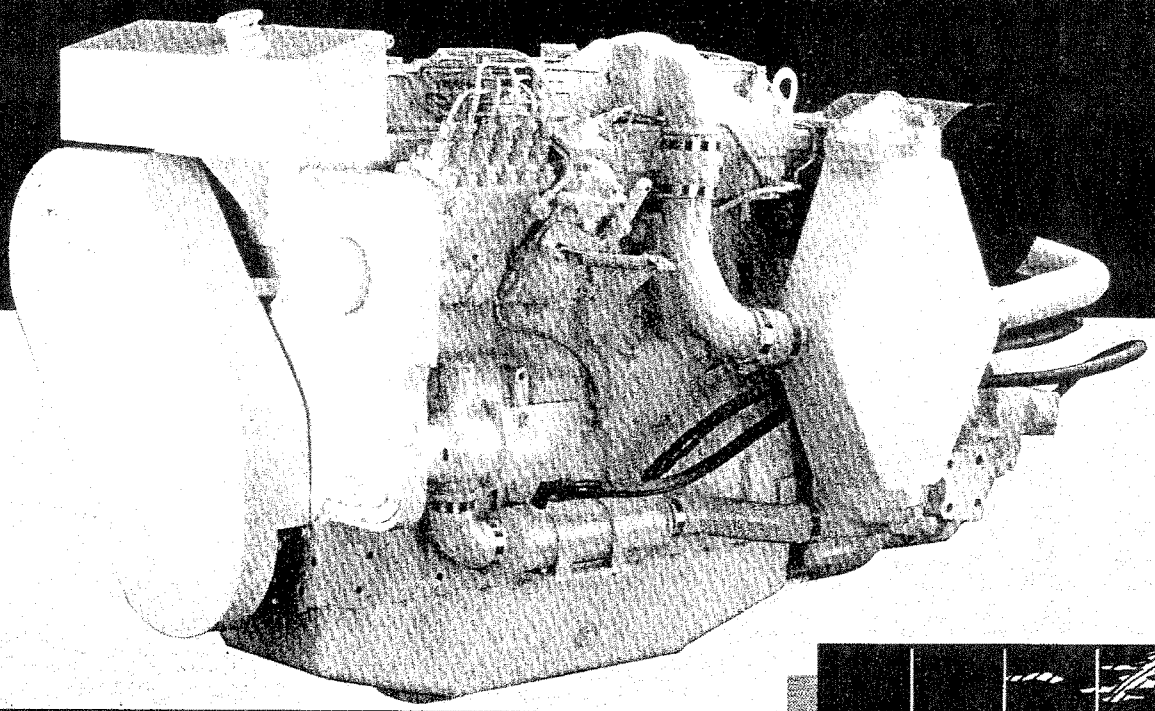
[redacted]

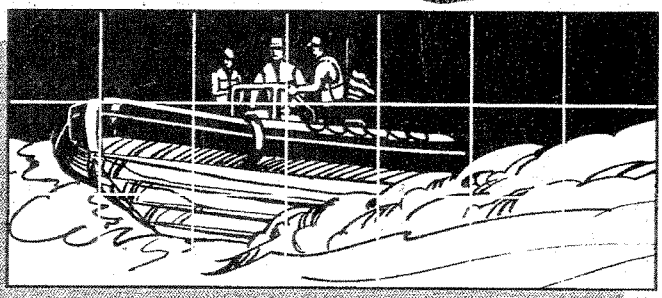
Derek Walden
Director – Worldwide Customer Support
Cummins MerCruiser Diesel

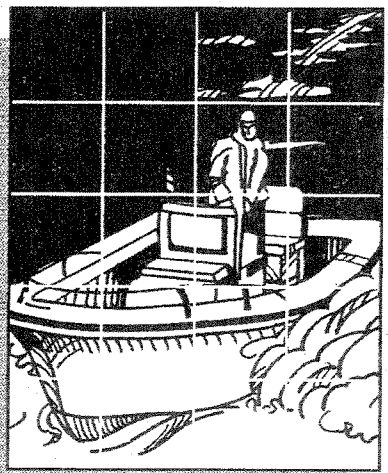
Cc: Mr. Brian Curtis,
Engineering Group Chairman,
National Transportation Safety Board

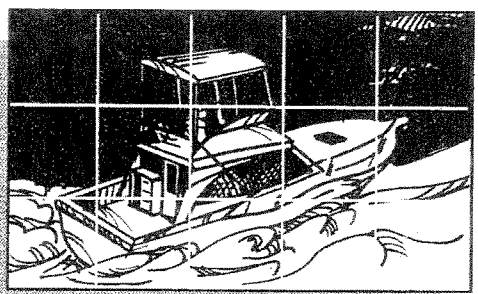
Encl: Raw Water Pump – Replacement, Operation and Maintenance Manual, B and C Series Marine Propulsion Units, Bulletin 3666022-00

Operation and Maintenance Manual
B and C Series Marine Propulsion Units
Worldwide



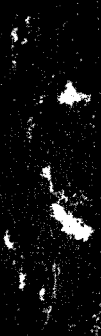






Cummins Engine Company, Inc.
Box 3005
Columbus, Indiana, U.S.A., 47202
Cable: CUMDIEX COLUMBUS

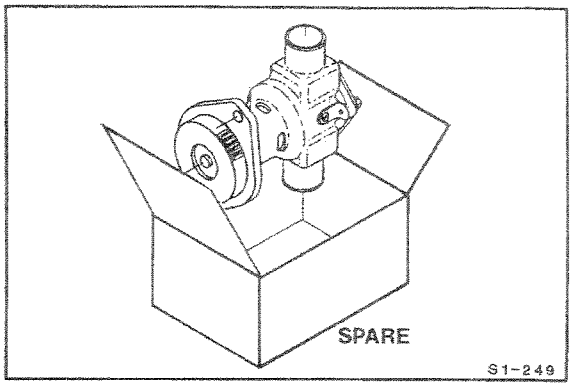
Registered Office
Cummins Engine Company, Ltd.
46-50 Coombe Road
New Malden,
Surrey KT3 4QL,
England
Cable: CUMEUR G
Registration No. 573951 England



Bulletin No. 3666022-00 Printed in U.S.A. 3/92

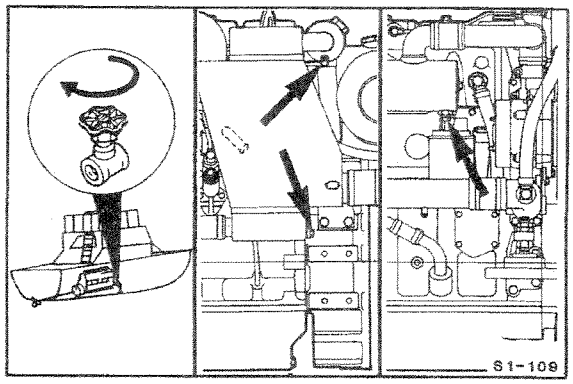
Raw Water Pump - Replacement

NOTE: Repairs are limited to changing the impeller and the gasket. A spare pump, complete with drive gear installed, should be kept on board.



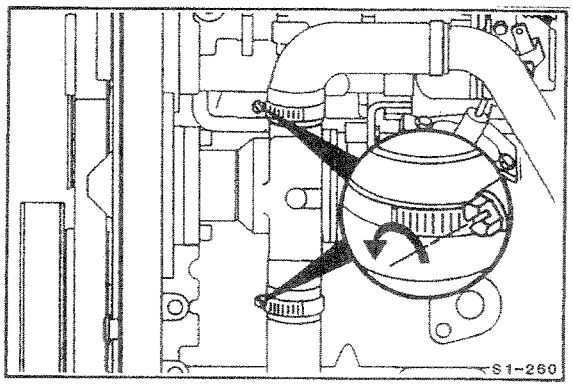
Shut off the water inlet valve.

Drain the raw water system.



5/16 Inch Nutdriver or Screwdriver

Remove the raw water inlet and outlet connections.



15 mm

Remove the capscrews which hold the raw water pump adapter flange to the gear cover.

Remove the raw water pump and flange assembly.

Remove and clean the gasket surfaces.